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Department of the Interior

United States Bureau of Mines
John W. Finch, Director

INFORMATION CIRCULAR

VALUE OF THE COOPERATIVE METHOD IN FIRST-AID TRAINING

BY

J. J. Forbes

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UNITED STATES BUREAU OF MINES

VALUE OF THE COOPERATIVE METHOD IN FIRST-AID TRAINING 1/

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INTRODUCTION

First-aid training is an essential part of safety programs in the mining industry, but it is only a means to an end; first-aid training will not eliminate accidents, but unquestionably it is of considerable value in any accident-prevention program. Numerous features should be incorporated in any efficient, well-developed safety plan; in addition to first-aid training safety work, to be reasonably effective, should include the establishment and maintenance of a safety organization, safety competitions between mines or sections of mines, safety-inspection committees, accident-investigation committees, safety meetings of mine officials, safety bulletins and posters, employees' safety publications, Holmes Safety Chapters (which provide for monthly safety meetings of all employees), and numerous other activities looking to safe operation of mine or plant. These features are supplementary to the fundamentals of safety--adequate and effective supervision and discipline. Years of experience, however, have demonstrated that first-aid training is a good accident-prevention auxiliary and should be made an integral part of every company's safety program. Many safety-organization plans have failed because they have been based upon the assumption that the supervisory force should be given full authority and responsibility for achieving safety and eliminating accidents and that the workers, who are most vitally concerned, are nonessential. First-aid training causes the employees to feel that they have a personal and full participation in the safety program and is now available so readily that no individual or organization has any valid excuse for not having it.

Early investigations made with a view to bettering health and safety conditions among the employees in the mineral industries demonstrated the need of prompt care of injured employees because, under the difficulties inherent in the occupation, seemingly unimportant wounds, when not treated promptly, became infected and caused permanent disability and even death. Many seriously injured persons, brought out of mines and plants by fellow workers who were ignorant of the approved methods of giving first aid or of safe means of transportation,

1/ The Bureau of Mines will welcome the reprinting of this paper, provided the following footnote acknowledgment is used: "Reprinted from U. S. Bureau of Mines Information Circular 6803."

2/ Supervising engineer, Safety Division, U. S. Bureau of Mines, Pittsburgh, Pa.

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have been handled in such a manner as to cause suffering and accentuate injuries to such a degree that permanent disability or even death has resulted. The first-aid-trained person, on the other hand, knows or should know the care necessary for the treatment and transportation of the injured and the proper treatment by artificial respiration of a person whose respiration has ceased or who has been seriously affected by electric shock, gas poisoning, suffocation, drowning, or paralyzing blows to body or head; he is trained in the prone-pressure or Schaefer and the Sylvester methods of administering artificial respiration and knows how to remove a person from contact with an electric conductor without subjecting himself to injury. He has been taught how to recognize arterial, venous, and capillary bleeding and how to control it. He also knows the proper treatment for shock and the aseptic dressing of open wounds, how to apply splints and to bandage fractures and dislocations so that the injured person may (if necessary) be safely transported relatively long distances to a hospital, and how to handle an injured person gently so as to minimize suffering or injury. The need of general instruction to all mining employees in first aid is apparent to any person who visualizes conditions under which accidents occur and injuries are received in and around mine workings.

For a number of years after the Bureau of Mines started first-aid training as a regular activity, all training by the Bureau was conducted directly by the personnel of the Bureau's cars and field stations, usually, however, with a view to giving the training only to relatively few of the personnel. The popularity of first-aid training grew, however, and it became increasingly difficult to fulfill the demand for trained instructors when thinking people finally realized that first-aid training has good accident-prevention features and gives immediate help and comfort to those unfortunate enough to become injured.

During the year ended June 30, 1926 a cooperative plan was initiated on a fairly extensive scale in Illinois and later adopted in most of the States in which training work was carried on by the Bureau of Mines. The cooperative plan of training consists of training employees in a mine, plant, or establishment by means of company instructors working under the direction and supervision of a Bureau instructor. A larger number of employees may be trained by this method than by the direct training method formerly used by the Bureau of Mines, and it has numerous attractive features; employees who receive the training by this plan usually are inclined to feel that they are participating in the safety program, and in this way cooperation in the general safety work in many cases has been obtained more readily than by other means. By March 1, 1934 more than 730,000 persons in the mining and allied industries had been trained in first aid by the Bureau of Mines method and or through the personnel of the Bureau.

SYSTEM OF TRAINING ALL EMPLOYEES

Although complete first-aid training apparently was conducted for the first time in the spring of 1923 in West Virginia, the cooperative plan, using

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NUMBER [redacted]

The United States of America

DEPARTMENT OF THE INTERIOR

BUREAU OF MINES

First-Aid Instructor's Certificate

This is to certify that _____ of _____ is qualified to **CONDUCT CLASSES IN FIRST AID TO THE INJURED.** Those completing a course under his direction, if found qualified on examination by a representative of the United States Bureau of Mines, will be given a certificate of first-aid training by the Bureau of Mines.

Recommended by _____

Approved _____
SUPERVISING ENGINEER
SAFETY DIVISION

_____
DIRECTOR

Washington, D.C. _____ 19__

This certificate remains effective for one year from date of issue. It may be renewed annually by a representative of the Bureau of Mines, provided the holder has trained a class during the year, the members of which qualified for certificates. If renewed for five years, it shall become permanent.

Renewed _____ 19__ by _____

Renewed _____ 19__ by _____

Renewed _____ 19__ by _____

Renewed _____ 19__ by _____

Renewed _____ 19__ by _____

Figure 1.— First-aid instructor's certificate.

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company instructors, was first used on a large scale in southern Illinois during 1926, when over 20,000 miners received the Bureau of Mines full first-aid course under this plan.

The system provides for giving the complete course of first aid to all employees at a mine (whether large or small) within a period of a few weeks.

Instructors or keymen.- Usually, with the aid of the operating officials, picked men constituting about 10 percent of the employees at a mine or plant are selected as instructors or keymen. These men are chosen because they are more alert mentally or have more education than the average man employed in the mine and exhibit a better knowledge of first aid, with ability to teach and serve as leaders. The instructors are given an intensive course in first aid for at least 30 hours, or until they are thoroughly grounded in the theory as well as the practice of first aid as laid down by the Bureau of Mines course. The course is taught to the keymen in the form in which it is to be given to the general employees. This instruction requires 15 hours, after which 15 or more hours are devoted by the men to practice in giving the instruction. Each man is first required to teach a part of each lesson to the other keymen, and those who show the required ability are selected to teach groups of other employees.

An instructor who has been awarded a Bureau of Mines first-aid certificate, or who has been recommended for such a certificate by a Bureau representative, is recommended for a first-aid instructor's certificate (see fig. 1) if he has successfully trained at least 10 men connected with the mineral industry who through examination by a Bureau of Mines representative have been found qualified and eligible for first-aid certificates. The recommendation by the Bureau representative is approved by the supervising engineer of the Safety Division, and the certificate is signed by the Director of the United States Bureau of Mines at Washington, D. C. The certificate is effective for 1 year and can be renewed annually provided the holder has again trained or retrained a class in first aid of which at least 10 persons are found eligible and qualified through examination by a Bureau of Mines instructor. Each year the renewal date is placed on the certificate and signed by the Bureau representative conducting the examination. When five such renewals (a year or more apart) are received, the certificate becomes permanent, signifying that the holder is a competent instructor in first aid to the injured; the certificate thereafter requires no further renewal. As of March 1, 1934, 4,208 instructor's certificates requiring annual renewal and 71 permanent instructor's certificates had been issued; these instructor's certificates have had a definite dollars and cents value to holders during the depression as many persons have secured and maintained employment not only in mining but also in other industries because they held a Bureau of Mines First-Aid Instructor's Certificate.

Program for execution of 100-percent training.- Immediately after completion of the key class, the men showing the greatest aptitude are chosen to instruct a group in the complete first-aid course. The procedure usually is directed by the safety engineer or the superintendent of the plant who, with

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the assistance of the Bureau representative, selects the keymen who are to act as instructors, arranges for the meeting places, notifies the men who are to attend the classes, and supplies the materials, such as bandages, splints, etc.

Several classes, preferably of not more than 20 or 25 men each, are started simultaneously, and, to expedite the work, the meeting places of the classes are concentrated as much as feasible in order that the Bureau representative can visit each class at least once during each period. Public buildings, such as schoolhouses, or similar buildings with a number of rooms, are desirable for this purpose. It is not uncommon for a plant to have 12 to 15 classes going at the same time in order that the training of every man at the plant can be accomplished in a few weeks. The work of instructing the employees is handled entirely by the company instructors or keymen, but they are assisted and supervised by a Bureau of Mines representative who, at the completion of the course, examines the classes. The material required for one class should consist essentially of the following:

Charts

One set of first-aid charts (American Red Cross type) for at least every two classes working at the same time and conducted within the same building.

Splints

Number of pieces	Size of splints, inches	Position used
12	11 x 4 x 1/4	Hand and foot.
12	30 x 4 x 1/4	Upper limb.
12	14 x 4 x 1/4	Outer arm.
8	32 x 4 x 1/2	Forearm.
8	38 x 4 x 1/2	Thigh (inside) or kneecap.
4	54 x 4 x 1/2	Thigh (outside).
6	84 x 4 x 1	Broken back.
9	18 x 4 x 1	do.
4	84 x12 x 1	Pelvis or hip.

Bandages, gauze, etc.

1 piece picric acid gauze.
1 compress, 3 1/2-inch sterile (for demonstration).
18 compresses, 3 1/2-inch unsterile.
18 compresses, 2 1/2-inch unsterile.
72 triangular bandages (made from 40-inch sheeting or muslin).
10-yard bolt of yellow cheesecloth (used as picric acid gauze).
50-foot piece of brattice cloth or canvas.
1 blanket.
1 stretcher.

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Class instruction.- Employees are trained in small groups, preferably of not more than 25 persons, and every member receives individual attention from the instructor. Each instructor is given an outline of the Bureau of Mines standard first-aid course which requires a minimum of 15 hours. The outline is so arranged that the complete course in first aid can be covered thoroughly in five sessions of 3 hours each. The outline of the lessons used by the instructor follows:

INSTRUCTOR'S OUTLINE OF BUREAU OF MINES STANDARD FIRST-AID COURSE

Lesson 1

1. Roll call.

2. Brief talk on purpose, effects, and benefits of first aid.

3. Brief talk on anatomy of human body.

   a. Skeleton.
   b. Joints.
   c. Muscles.
   d. Tendons.
   e. Skin.

4. Shock.

   a. The nervous system.
   b. Physical shock; cause and effect.
   c. Treatment for shock; use of stimulants.

5. Artificial respiration.

   a. The lungs and respiration.
   b. Need for artificial respiration.
      (1) Electric shock.
      (2) Gas poisoning.
      (3) Drowning.
      (4) Asphyxiation.

   c. Description and demonstration by instructor of Schaefer and Sylvester methods of artificial respiration and how to change operators without breaking rhythm.
   d. Class practice in both methods of artificial respiration and change of operators.

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6. Bandages and compresses.

   a. Describe and show class triangular bandages and compresses and show use.
   b. Pass out triangular bandages.
   c. Describe and demonstrate method of folding cravat bandage.
   d. Describe and demonstrate method of tying square knot.
   e. Have class practice folding cravat bandage and tying square knot.

7. Control of bleeding.

   a. Explain the heart and its action.
   b. Describe circulation and time it takes person to bleed to death.
   c. Describe symptoms of arterial, venous, and capillary bleeding.
   d. Describe methods of controlling bleeding by
      (1) Cold applications.
      (2) Elevation.
      (3) Direct pressure.
      (4) Digital pressure.
      (5) Tourniquet.

   e. Point out pressure points on the arterial system and demonstrate control of bleeding by digital pressure.
   f. Explain to class tourniquet and improvised tourniquet, when and how to use, and danger of not loosening at 20-minute intervals.
   g. Demonstrate application of tourniquet to pressure points.
   h. Have class apply tourniquets to all pressure points.

8. Roll call.

Lesson 2

1. Roll call.

2. Give complete review of previous lesson with special emphasis on shock, artificial respiration, and control of bleeding.

3. Pass out bandages and compresses, and if previous lesson has not been completed, finish it.

4. Wounds.

   a. Describe wounds.
      (1) Incised.
      (2) Lacerated.
      (3) Punctured.

   b. Describe treatment for wounds, danger of infection, and how to guard against infection.

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c. Instructor demonstrates and has class practice dressings for the following wounds:

(1) Head, temple, face, or ear.
(2) Forehead.
(3) Eye.
(4) Nose.
(5) Chin.
(6) Neck.
(7) Shoulder.
(8) Armpit.
(9) Arm torn from body.
(10) Amputation of arm or forearm.
(11) Arm.
(12) Elbow.
(13) Forearm.
(14) Wrist.
(15) Palm of hand.
(16) Back of hand.
(17) Finger.
(18) End of finger.
(19) Between shoulders.
(20) Back, chest, side, or abdomen.
(21) Lower part of abdomen, back, or buttocks.
(22) Groin.
(23) Crotch.

5. Roll call.

Lesson 3

1. Roll call.

2. Give complete review of previous lessons with special emphasis on shock, artificial respiration, and control of bleeding.

3. Pass out bandages and compresses, and if previous lesson has not been completed, finish it.

4. Continue demonstrations and have class practice dressing for the following wounds:

(24) Hip.
(25) Thigh.
(26) Amputated leg or thigh.
(27) Knee.
(28) Leg.
(29) Angle or foot.
(30) Toe.
(31) End of toe.

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5. Describe and explain treatment of

   a. Foreign bodies in eye.
   b. Foreign bodies in ear.
   c. Foreign bodies in nose.
   d. Foreign bodies in windpipe or throat.
   e. Foreign bodies in stomach.

6. Describe treatment and symptoms of

   a. Bruises.
   b. Strains.
   c. Sprains.

7. Dislocations.

   a. Describe symptoms and treatment for dislocation.
   b. Describe and explain symptoms and treatment for dislocation of lower jaw, fingers, and toes.

8. Demonstrate and have class practice dressings for following dislocations:

   a. Lower jaw (after being reduced).
   b. Shoulder.
   c. Elbow.
   d. Hip.
   e. Knee or kneecap.

9. Fractures.

   a. Describe symptoms and treatment of

      (1) Simple fractures.
      (2) Compound fractures.

   b. Explain danger of moving persons or not dressing fractures.
   c. Demonstrate and have class practice dressings for following fractures:

      (1) Skull.
      (2) Nose.
      (3) Jaw.
      (4) Collar bone.
      (5) Shoulder blade.
      (6) Arm.
      (7) Elbow.
      (8) Forearm.
      (9) Wrist.
      (10) Hand.
      (11) Fingers.

10. Roll call.

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Lesson 4

1. Roll call.

2. Give complete review of previous lessons with special emphasis on shock, artificial respiration, controll of bleeding, and treatment for wounds.

3. Pass out bandages and compresses, and if previous lesson has not been completed, finish it.

4. Demonstrate and have class practice following dressings for fractures:

(12) Rib.
(13) Spine.
(14) Pelvis.
(15) Thigh.
(16) Kneecap.
(17) Leg.
(18) Ankle.
(19) Foot or toes.

5. Burns or scalds.

a. Describe burns or scalds and treatment.
b. Describe burns of the eye by chemicals.
c. Demonstrate and have class practice following dressings for burns:

(1) Head.
(2) Face.
(3) Neck.
(4) Arm.
(5) Forearm.
(6) Hand.
(7) Body.
(8) Thigh.
(9) Leg.
(10) Foot.

6. Roll call.

Lesson 5

1. Roll call.

2. Give review of previous lessons with special emphasis on shock, artificial respiration, control of bleeding, treatment for wounds, dislocations, and fractures.

3. Pass out bandages and compresses, and if previous lesson has not been completed, finish it.

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5. Describe and explain treatment of

   a. Foreign bodies in eye.
   b. Foreign bodies in ear.
   c. Foreign bodies in nose.
   d. Foreign bodies in windpipe or throat.
   e. Foreign bodies in stomach.

6. Describe treatment and symptoms of

   a. Bruises.
   b. Strains.
   c. Sprains.

7. Dislocations.

   a. Describe symptoms and treatment for dislocation.
   b. Describe and explain symptoms and treatment for dislocation of lower jaw, fingers, and toes.

8. Demonstrate and have class practice dressings for following dislocations:

   a. Lower jaw (after being reduced).
   b. Shoulder.
   c. Elbow.
   d. Hip.
   e. Knee or kneecap.

9. Fractures.

   a. Describe symptoms and treatment of

      (1) Simple fractures.
      (2) Compound fractures.

   b. Explain danger of moving persons or not dressing fractures.
   c. Demonstrate and have class practice dressings for following fractures:

      (1) Skull.
      (2) Nose.
      (3) Jaw.
      (4) Collar bone.
      (5) Shoulder blade.
      (6) Arm.
      (7) Elbow.
      (8) Forearm.
      (9) Wrist.
      (10) Hand.
      (11) Fingers.

10. Roll call.

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Lesson 4

1. Roll call.

2. Give complete review of previous lessons with special emphasis on shock, artificial respiration, controll of bleeding, and treatment for wounds.

3. Pass out bandages and compresses, and if previous lesson has not been completed, finish it.

4. Demonstrate and have class practice following dressings for fractures:

   (12) Rib.
   (13) Spine.
   (14) Pelvis.
   (15) Thigh.
   (16) Kneecap.
   (17) Leg.
   (18) Ankle.
   (19) Foot or toes.

5. Burns or scalds.

   a. Describe burns or scalds and treatment.
   b. Describe burns of the eye by chemicals.
   c. Demonstrate and have class practice following dressings for burns:

      (1) Head.
      (2) Face.
      (3) Neck.
      (4) Arm.
      (5) Forearm.
      (6) Hand.
      (7) Body.
      (8) Thigh.
      (9) Leg.
      (10) Foot.

6. Roll call.

Lesson 5

1. Roll call.

2. Give review of previous lessons with special emphasis on shock, artificial respiration, control of bleeding, treatment for wounds, dislocations, and fractures.

3. Pass out bandages and compresses, and if previous lesson has not been completed, finish it.

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4. Describe symptoms and treatment of:

   a. Rupture.
   b. Poisons.
      (1) Corrosive poisons.
      (2) Irritant poisons.
      (3) Alcoholic poisoning or apoplexy.
   c. Fainting.
   d. Sunstroke.
   e. Heat exhaustion.
   f. Frostbite or freezing.
   g. Snake bite.

5. Transportation.

   a. Brief talk on transportation.
   b. Demonstrate and have class practice 1-, 2-, and 3-man carries.
   c. Describe types of stretchers.
      (1) Army stretcher.
      (2) Navy stretcher.
      (3) Improvised stretchers.
   d. Demonstrate and have class practice making improvised stretcher.
   e. Stretcher drill.
      (1) Fall in.
      (2) Count off.
      (3) Procure stretcher.
      (4) To patient.
      (5) Lift patient.
      (6) Place stretcher under patient.
      (7) Lower patient on stretcher.
      (8) Carry stretcher.
      (9) Carry stretcher over obstacle.
      (10) Lower stretcher.
      (11) Load in ambulance.
      (12) Unload stretcher.

6. Divide class into teams.

7. Give teams problems and train teams how to work problems and perform teamwork.

8. Questioning and examination of class by Bureau of Mines instructor.

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To impress upon class members the relative importance of the various subjects covered, the instructor is provided with an outline of seven fundamentals of first aid. By placing artificial respiration first, the importance of starting resuscitation without delay is emphasized; similarly by placing control of bleeding second, the importance of arresting the flow of blood without delay is also brought to the attention of the men early in the course. Arrangement according to fundamentals also is of considerable advantage in conducting examinations in logical order. The seven fundamentals are given in the order of importance and indicate the logical order of administering treatment.

FIRST-AID INSTRUCTOR'S
SEVEN FUNDAMENTALS OF FIRST AID

1. Artificial respiration.

   a. Two methods of artificial respiration.

      (1) Schaefer or prone method.
      (2) Sylvester method.

   b. Diaphragm must be compressed 12 to 15 times per minute with either method.

2. Control of bleeding.

   a. Three kinds of bleeding.

      (1) Arterial.
      (2) Venous.
      (3) Capillary.

   b. Five methods of control.

      (1) Tourniquet (loosen every 20 minutes).
      (2) Digital pressure.
      (3) Direct pressure.
      (4) Elevation.
      (5) Cold application.

3. Shock.

   a. Cause and effect.
   b. Use of stimulants.
   c. Covering, applying heat, rubbing, etc.

4. Care of open wounds.

   a. Three kinds of wounds.

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(1) Incised.
(2) Lacerated.
(3) Punctured.

b. Treatment.

(1) Remove dirty clothing.
(2) Do not touch with hands, clothing, etc.
(3) Do not wash.
(4) Apply only sterile dressing.
(5) Treat for shock after bleeding is stopped.

5. Care of fractures and dislocations.

a. Fractures.

(1) Two kinds.

(a) Simple.
(b) Compound.

(2) Symptoms.

(a) Swelling.
(b) Deformity.
(c) Probably loss of motion.

(3) Treatment.

(a) Apply tourniquet in compound fracture.

(1) Tight if arterial bleeding.
(2) Loose if no arterial bleeding.

(b) Arch compound fracture.
(c) Support with splints, bandages, etc.
(d) Treat for shock after bleeding is stopped.

b. Dislocations.

(1) Symptoms.

(a) Deformity.
(b) Stiffness of joint.

(2) Treatment.

(a) Reduce following:
(1) Lower jaw.
(2) Finger.
(3) Toe.

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NUMBER [redacted] YEAR [redacted]

The United States of America

DEPARTMENT OF THE INTERIOR

BUREAU OF MINES

Certificate of First-Aid Training

This is to certify that _____ *of* _____

has completed the Bureau of Mines course of instruction in giving

FIRST AID TO THE INJURED

Recommended by

_____

Approved

_____
SUPERVISING ENGINEER
SAFETY DIVISION

_____
DIRECTOR

Washington, D. C.

The holder of this certificate should be re-examined annually to insure efficiency

Figure 2.—Certificate of first-aid training.

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THE UNITED STATES OF AMERICA

DEPARTMENT OF THE INTERIOR

BUREAU OF MINES

CERTIFICATE OF FIRST-AID TRAINING

This certifies that .....

of....., has completed the course of First-Aid Instruction as prescribed by the Bureau of Mines.

TRAINED BY

..... Director.

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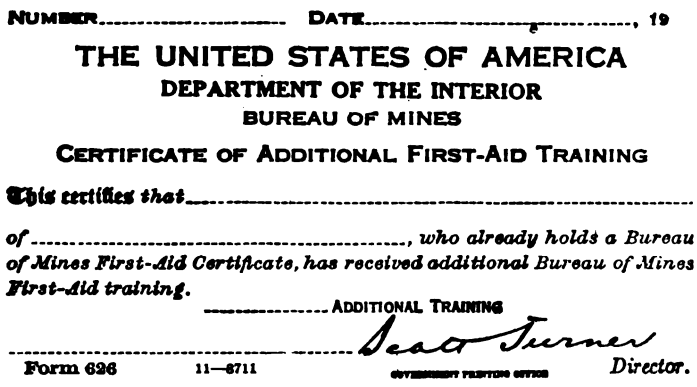
Figure 3A.— Pocket certificate of initial first-aid training.



NUMBER..... DATE....., 19

THE UNITED STATES OF AMERICA

DEPARTMENT OF THE INTERIOR

BUREAU OF MINES

CERTIFICATE OF ADDITIONAL FIRST-AID TRAINING

This certifies that.....

of....., who already holds a Bureau of Mines First-Aid Certificate, has received additional Bureau of Mines First-Aid training.

..... ADDITIONAL TRAINING

..... Director.

Form 626 11—8711 GOVERNMENT PRINTING OFFICE

Figure 3B.— Pocket certificate of additional first-aid training.

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(b) Support with splint, bandages, etc.
(c) Treat for shock.

6. Care of burns.

a. Three kinds of burns.

(1) Dry.
(2) Wet.
(3) Chemical.

b. Treatment.

(1) Remove clothing.
(2) Apply picric acid gauze.
(3) Guard against infection.
(4) Do not attempt to neutralize chemical burns, but pour water over burned surface.
(5) Treat for shock.

7. Transportation.

a. 1-, 2-, and 3-man carries.
b. Types of stretcher.

(1) Army.
(2) Navy.
(3) Improvised.

c. Stretcher drill.

(1) Line up.
(2) Count off.
(3) Procure stretcher.
(4) Load stretcher.
(5) Carry stretcher; four men carry; rear man out of step.
(6) Unload stretcher.

After a class has completed the full course of instruction by the keyman or instructor, it is examined by a Bureau of Mines representative. Any person who is an employee of the mineral industries and who successfully passes the examination is recommended for a certificate of first-aid training similar to that shown in figure 2. In addition to the certificate, he is given a pocket card at the time of the examination so he may carry it with him to show to prospective employers; this card in many localities is now recognized as an indication that the possessor is a safe workman. A facsimile of the card given at the completion of initial training is shown in figure 3A.

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The Bureau of Mines recommends that first-aid-trained men should be re-examined every 6 months in order to insure their efficiency. In most places additional training is given before the men are examined by a Bureau of Mines representative. When a Bureau of Mines representative examines an employee and finds him proficient, he receives a pocket card indicating that he has complete first, second, third, etc., additional training. A facsimile of this card is shown in figure 3B.

100-percent certificate.- The value of having every employee in a mine or plant trained in first aid has been recognized by employers in many parts of the United States, and the Bureau of Mines now issues a certificate when 100 percent of the employees of a mine or plant have been trained. To March 1, 1934, 1,104 mines and plants in the mining and allied industries had received certificates of 100-percent training; 231 such certificates were issued during the fiscal year ended June 30, 1933. A facsimile of this certificate is shown in figure 4. When the employees of a mine or plant having a 100-percent certificate are retrained and examined and found qualified by a Bureau of Mines instructor, a new certificate as of the date of retraining is issued.

Following is a record of the first-aid training conducted by the Bureau from July 1, 1910 to June 30, 1933:

Fiscal year	Total number trained	Number cooperatively trained	Number cooperatively trained, percent
1910-26	146,993	-------	-------
1927	37,917	13,599	36
1928	45,572	20,433	45
1929	79,657	40,504	51
1930	111,088	77,938	70
1931	110,258	85,593	78
1932	96,581	76,827	80
1933	73,019	56,084	77
1910-33	701,085	370,978	53
1927-33	554,092	370,978	63

This table shows that 701,085 persons were trained from July 1, 1910 to June 30, 1933 and that 370,978, or 53 percent, were trained by company instructors in cooperation with and under the direct supervision of the Bureau of Mines; during the fiscal year 1927, 36 percent of the total training was done on the cooperative plan. This type of training has shown a remarkable increase annually, the peak being reached in 1932, when 76,827 persons, or 80 percent of the total, were so trained; in the past 7 years 370,978 persons or 63 percent of the total trained by the Bureau during that period, were instructed under the cooperative plan.

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NUMBER [redacted]

The United States of America

DEPARTMENT OF THE INTERIOR

BUREAU OF MINES

This is to certify that on _____ *19__ the*

_____

at _____ *had* **100 PER CENT** *of its employees trained in first aid to the injured in cooperation with instructors of the United States Bureau of Mines.*

_____ *Washington, D. C.*

DIRECTOR

Figure 4.— 100-percent first-aid training certificate.

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VALUE OF FIRST AID

The advantages of first-aid training are manifold, and these advantages have been materially enhanced with the advent of 100-percent first-aid training. Direct benefits that accrue from first-aid training likewise will accrue when 100-percent training is given. Some of the value and benefits of the cooperative plan of first-aid training are as follows:

1. Competent instructors are provided for the plant.- The greatest benefit is derived from organized groups of employees trained in treating injuries. It is easy to forget many important points of the training that are absolutely necessary to effective treatment of injuries, but if teams are organized and trained at regular intervals, competent first-aid men are always available in any emergency, and by careful planning a competent instructor can be placed in each section of a plant or mine. This instructor may treat minor injuries, or if injuries are severe he can commandeer other trained workers who under his direction or cooperating with him may prevent infection by proper treatment and more serious injury by careful transportation of the injured.

2. Small classes assure individual attention.- Earlier methods of training employees in first aid to the injured often consisted of lectures, and in some cases the number of men attending each class was so large that many failed to grasp the subjects thoroughly. Instruction of employees in small classes by one of their fellow workmen has the added advantage of making those who take the course feel at ease; the men discuss more readily the points that are not clear to them, and practically all of them obtain a thorough knowledge of the fundamentals of first aid. Teams of six men each may be formed to work together; this not only develops teamwork, but also, when the instruction is not clearly understood, has the advantage that knowledge may be gained by watching other team members or by asking questions. Usually enough men with initial training in first aid are available for each group of new men, leaving the instructor free to go from group to group, point out errors, and commend good work.

3. Large plants can be completely trained in a comparatively short time.- Under the system of direct training by a Bureau of Mines representative, several weeks would be required to train all employees of a large mine or plant; by the use of company instructors the training is greatly expedited, and a large number of men may be trained in a comparatively short time. This has a decided advantage in that the training can be concentrated so as to interfere least with the operations of the mine or plant and with the outisde activities of employees.

4. An active spirit of cooperation and fellowship is sponsored by the plan.- The dressing of imaginary wounds becomes interesting; the men brought together in small groups become well acquainted with one another, and whatever spirit of individual aloofness may have prevailed before generally is broken down and a spirit of cooperation developed during training. A prominent coal-mine operator states: "It certainly does get results to have your men trained;

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it doesn't only get results in preventing accidents; you get better work; get better cooperation throughout the mines in every respect. When you do this it shows the men that work for you that you are interested in their families and welfare as well as in your mine and paying compensation." Another coal-mine division superintendent is thoroughly convinced that cooperative training builds up cooperation between the employer and employee, which is one of the most important fundamentals of accident-prevention work as safety cannot be attained without it.

5. A nucleus of competent instructors is left at the plant so the interes in first aid does not cease with the withdrawal of the Bureau of Mines safety car or representative.- First-aid training, to be effective, should be renewed at least once each year and more often if possible, and as new employees are taken into the organization they should be trained by the competent staff of trained instructors available. Constant effort is required to keep the first-aid movement alive, and it is necessary to have a number of trained teams at each mine if the utmost benefit is to accrue from this safety method. The team members generally should be compensated in some manner to keep the interes alive; the majority of mine operators do not pay the teams for the training time, but teams are sent to various State or national meets each year, which gives the first-aid workers an enjoyable trip. All the teams at the mines of one large coal-mining company are given an opportunity to compete for the honor of representing the company at such meets. One mining company states that whenever it has 5 or 6 new employees who have not had first-aid training a class is formed for instruction in first aid, thus keeping the plant trained as nearly 100 percent as possible.

Interest is kept alive in one organization by using the instructors to coach a number of first-aid teams for contests. The instructors and the more competent team members also give instruction to other groups, such as boy scouts, public-school pupils, and similar organizations. The officials talk first aid and the movement, kept alive by their work and interest, becomes a real factor in reducing accidents. All new employees in this company are required to have had first-aid training prior to employment. Another organization hires all new employees with the understanding that they will take this training immediately, and no difficulty has been experienced in maintaining this mine on a 100-percent, first-aid-trained basis. The issuance and annual renewal of instructor's certificates is an incentive for these men to train employees; frequently when an instructor leaves the employ of a company in which 100-percent first-aid training has been maintained and goes into a plant or mine in which first-aid training is not maintained he will, on his own initiative, form a class. Recently an instructor, failing to get the cooperation of the management, assembled a class of 25 men, borrowed splints from a neighboring mine, and purchased triangular bandages and compresses himself in order that the volunteers could be trained.

6. The man who has been trained in first aid is generally more careful because he has been led to visualize serious personal injuries.- The superintendent of a Pennsylvania coal mine employing about 150 men is enthusiastic

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about 100-percent first-aid training because in his opinion it makes the men more careful, a conclusion drawn from the fact that the mine operated for 6 successive months without a lost-time injury after having been given 100-percent training. Another operator believes that 100-percent first-aid training reduces accidents mainly because a miner learns how weak his body is and what the opportunity is for a fatal accident, consequently he is more careful and takes fewer chances of receiving a severe injury. In some mines minor injuries do not decrease in proportion to major ones, and first-aid training is of definite aid here as it tends to make men "safety conscious." Another great advantage of first-aid training is the fact that after a man so trained receives an injury he knows how to take care of it himself and does so more readily than before he had the benefit of first-aid training. In one mine a first-aid kit is maintained in every section; among the materials included are bandages and small mercurochrome compresses which are sterilized and kept wrapped in wax paper; the latter precaution reduces the chances of infection resulting from the use of first-aid material. The value of training individuals has been expressed aptly by a mine executive as follows:

> First-aid training of employees is an educational movement, and education of employees for their own safety is one of the greatest accident-prevention methods we have. First-aid training as taught by the Bureau of Mines not only teaches a man how to take care of an injury, but its course of instruction calls attention to the hazards of mining and preaches accident prevention. If the course as given by the Bureau of Mines instructors is given serious consideration by the persons taking it, there is no doubt but what it is a good thing. First-aid training teaches a man to think in terms of physical suffering; causes him to view unusual situations in terms of safety; creates a tendency to place oneself mentally in the victim's position; induces the pupil to study how to keep himself from being involved in an accident; impels a man to analyze his particular job and, by so doing, he will foresee and eliminate conditions that might bring about an accident; and urges men to take more interest in their physical well-being.

A large petroleum company analyzed the records of each employee who had been injured and found that 1 man who had received the training was injured for every 4 who had not received first-aid training; in other words, the ratio was 4 to 1. This company also found that first-aid classes stimulated safety work, created safety interest, and rewarded the company in returns that could not possibly be compiled. The general manager of a large bituminous-coal company stated publicly that the experience of his company had been that the ratio of men injured who had first-aid training to those who had not had this training was about 1 to 8.

Another operator reported that after all employees had received training more men reported minor accidents and received treatment, thereby reducing infections and lost time; less trouble was experienced in having accidents reported by the men; and the employees took a decided interest in reporting

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dangerous conditions as well as injuries, which resulted in much better understanding between the employees and the employer. The tonnage of coal produced for each lost-time accident was increased about 50 percent in 4 years; the increase in tonnage produced between accidents indicated that employees were cooperating with the safety movement. Prior to the 100-percent campaign, many of the employees looked with suspicion at the first-aid movement; however, after receiving the training, the same men became ardent supporters.

7. A first-aid trained man is an asset to any mine or plant because he can relieve an injured employee of much suffering; in some cases he can actually save life.- If injuries are promptly and properly cared for by a man trained in first aid, after an accident occurs, complications are prevented and the injured is in much better condition for effective treatment by a doctor or hospital. Furthermore, when all the men at a mine or plant are trained, the possibility of treating an injured employee promptly is greatly increased. If proper treatment is not rendered promptly, cases requiring artificial respiration and control of arterial bleeding may result fatally. Treatment by trained workers will mean less loss of blood by the injured, better physical condition to combat the ever-present hazard of infection, and faster return to health and in cases of fractures or dislocations may prevent lifelong handicap from crooked limbs or stiffened joints. A coal-mine executive states:

> Our employees are proud of the fact that they have had the (first-aid) training, and we have noted a number of occasions where it proved very beneficial. While the average employee does not step forward in many cases and attempt to administer first aid, he will understand handling an injured person better, and, as a result, persons injured do not suffer so much from shock. Fortunately, our physicians are available at practically all times, and it is not so necessary that injured persons be given first aid, as a doctor is on the ground almost immediately after an injury is received.

The Bureau of Mines does not make any special effort to collect data on lives saved or cases treated by the application of first-aid methods; however, records voluntarily sent in by the field men of the Bureau and others have been tabulated. It is of interest to note that of a total of 200 cases reported during the fiscal year 1933, 108 lives are reported to have been saved. In electric shock, asphyxiation, suffocation, and drowning, artificial respiration was successful in restoring life in 67 percent of the cases reported. These are cases in which it is fairly certain that first-aid treatment saved life, while in arterial bleeding and miscellaneous cases it cannot be said with certainty that in every instance life was saved; however, it was reported that life was saved in probably 70 percent of the arterial bleeding cases treated. Records voluntarily sent to the Bureau from July 1, 1930 to June 30, 1933 indicate that life was saved in 522 of a total of 676 cases reported. Unquestionably, the cases actually reported to the Bureau represent a small proportion of the actual number of lives saved in the mineral industries through application of first-aid treatment. Based on the data at hand, it is estimated conservatively that at least 200 lives are saved in the mineral industries each

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year by prompt and effective first-aid treatment by persons who received their first-aid training directly or indirectly through the personnel of the United States Bureau of Mines.

The value of first-aid training to the individual is shown by the case of a truck driver for an oil company in Texas who was injured on June 8, 1931 when a gasoline delivery truck driven by him overturned while rounding a curve. The driver's foot, caught beneath the cab of the truck, was badly lacerated and crushed. The bones across the instep were so badly crushed that the fore part of the foot hung downward. The man applied a tourniquet to stop arterial bleeding and then crawled to the side of the road where he procured some mesquite bush and with an improvised splint and rags from the truck bandaged his foot. After completing the dressing he fainted from loss of blood. Passing motorists carried him to a hospital about 40 miles away where the doctor who treated him stated that without the first-aid treatment amputation undoubtedly would have been necessary when he arrived at the hospital, as it would have been impossible to set the foot in its swollen condition.

8. Financial savings are generally realized through reduction in compensation and insurance payments.- The training of 1,451 men in first aid by a large California petroleum company resulted in a 50-percent reduction in the number of infected cases, a 98.5-percent reduction in days lost, a 95.2-percent reduction in compensation and medical cost from infections, and a gross saving of approximately $73,740 a year. The secondary effect of such training was apparent in the reduction of the number and severity of accidents, with the result that large financial savings were made by this company. As part of an intensive safety program, a large coal-mining company gave first-aid training to practically all of its employees in 1928. The training, given under the supervision of the State Department of Mines and Minerals and the United States Bureau of Mines, was successful due to the complete cooperation given by the miners, with the result that approximately 2,300 men mined 1,850,777 tons of coal before a fatal accident occurred. All of the credit cannot be given to 100-percent first-aid training in this case; but the cooperation received from the miners, undoubtedly brought about by the 100-percent first-aid training, was a large factor in the reduction of accidents. As a result of 100-percent first-aid training another company was able to operate its mines for 6 months without a lost-time accident. A safety engineer of a coal company credits 100-percent first-aid training with having helped to reduce the number of accidents reported in 1932 by 53.5 percent compared with 1931. This company requires that every injury, even the slightest scratch, receive medical attention and that a report be made of all injuries.

9. Practical application of first aid.- A study of 359 accident cases on which data are available shows that the lives of 339 persons probably were saved by first aid. These cases include 214 from asphyxiation, 45 from electric shock, 36 from arterial bleeding, 25 from drowning, 9 from suffocation, and 30 from miscellaneous causes.

Of the 359 cases reported, 334 were handled by persons trained either directly or cooperatively by the Bureau of Mines, and 23 were treated by

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persons who were not trained by the Bureau of Mines but who employed its meth of treatment. The application of artificial respiration was necessary in 282 of the 359 cases.

Asphyxiation.- Asphyxiation is caused by the inhalation of air contamina with poisonous gas, such as carbon monoxide, sulphur dioxide, oxides of nitro chlorine, phosgene, ammonia, hydrogen sulphide, and hydrogen cyanide. It may also occur from oxygen deficiency. Recovery of asphyxiated persons generally depends upon prompt treatment, the degree of contamination of the air, the length of time the patient has been exposed, and his physical condition. Of 214 cases of asphyxiation by poisonous gas, 213 were saved by the application of artificial respiration. Oxygen was given in at least 158 of these cases. Suffocation, which is related to asphyxiation, was reported in 9 cases, with saving of life in 8.

Drowning.- In drowning, air is excluded from the lungs by water causing unconsciousness or death. If a person is recovered from the water promptly and artificial respiration is started with little delay, life may be saved. Of 25 cases reported, 20 lives were saved by the application of artificial respiration.

Hemorrhage.- Hemorrhage or bleeding is the uncontrolled flow of blood fro an artery, vein, or capillary. The loss of relatively large quantities of blood generally increases the condition of shock in the patient and may cause death. One of the most dangerous kinds of external bleeding is arterial hemorrhage which, if not controlled promptly by the application of a tourniquet may result in death from bleeding in a few minutes. Available records show th of 36 cases reported, 31 lives were probably saved by the application of first aid to control the bleeding; 29 of the 36 cases were treated by persons known to have been trained by the Bureau of Mines.

SUMMARY

Cooperative training is beneficial in itself, and when it forms an important part of a well-planned safety program its benefits are manifold. The chief ones are: (1) Competent instructors are provided for the mine or plant; (2) small groups of classes assure individual attention; (3) large mines or plants can be trained completely in a comparatively short time; (4) an active spirit of cooperation and fellowship is sponsored by the plan; (5) a nucleus of competent instructors is left at the plant so that interest in first aid does not leave with the Bureau of Mines safety car or representative; (6) a man who has been trained in first aid generally is a safer man because he has been made to visualize serious personal injuries; (7) a trained man is an asset to any mine or plant because he can relieve an injured employee of much suffering and in some cases actually save life; (8) financial savings are generally realized through reduction in compensation and insurance premiums; and (9) first aid has definite practical application.

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One hundred percent first-aid training enhances the opportunity to reap the foregoing benefits proportionately. It is believed that where self-training by a mining organization is maintained over a period of years it will effect a maximum benefit.

The United States Bureau of Mines has found that with 100-percent first-aid training the intermingling of the men, bosses, and plant officials in first-aid training classes, where everyone has a common interest in humane endeavor, has created a better feeling and understanding between the men in general and their company. Cooperative training propagates among the supervisory and working forces a spirit of mutual protection and regard for the well-being of all; in addition to making possible the first-aid treatment of persons who are unfortunate enough to be injured it also makes the recipients safety conscious and serves as one of the most effective agencies yet devised in the prevention of accidents in and around mines and plants in the mining and allied industries.

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